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SUSTAINABILITY OF MSMEs IN WARSHIP BUILDING TOWARDS ATMA NIRBHAR BHARAT

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Abstract

MSMEs are the corner stone for generating the national income and propelling the nation towards increased GDP contributing significantly to the Indian economy. One of the key factors in GDP is contribution from the industrial sector, which ought to be nurtured to keep up the momentum of growth in the economy. India has burgeoned from a buyer's Navy to the builder's Navy over the last five decades, building ships of varied class including the coveted aircraft carrier. Modern warships call for technologically advanced state of art of combat systems which need to be operationally supported and maintained to the highest levels with technological updates as a continuum, to achieve the ultimate objective of Atma Nirbhar Bharat. There is a real challenge for the MSMEs to be engaged in the multi-faceted disciplines of warship building and sustain themselves. Sustainability factor is a pivotal and predominant factor in the engagement of MSMEs in warship building.. Resources have to be pooled and collaborative efforts ought to be made by both the Government agencies and large industrial houses to sustain the MSMEs in the warship building arena. This paper examines the sustainability of MSMEs in the context of warship building by evolving certain key measurement indicators.

Key words

Warship building, MSMEs, Business with shipyards, sustainability, Technology, Atma Nirbhar Bharat, Measurement indicators, canonical correlation ,Wilks Statistic

I. Introduction

1.1 Warship building involves various stages such as design, engineering, construction, outfitting, testing and commissioning, and typically requires a large workforce with specialized skills and experience. It also involves the use of advanced materials and technologies, which can be costly and require significant investment in research and development. While it is possible for MSMEs to participate in warship building, the level of involvement may vary depending on the size and capabilities of the individual MSME. Collaborating with larger firms and Government agencies would provide the necessary resources and expertise. MSMEs can certainly contribute to one or more of the stages involved in warship building , depending on their specific areas of expertise.

1.2 As for example, an MSME with expertise in manufacturing specialized components or systems for ships may be able to supply those components to the shipbuilder. Similarly, an MSME with experience in engineering or design may be able to provide specialized services to the shipbuilder during the design and engineering phases. MSMEs by their own conglomeration and collaboration between them can certainly make a huge contribution to the warship building process. However, it is worth noting that warship building is often highly regulated and subject to stringent quality and safety standards. As a result, MSMEs that are interested in participating in warship building will need to ensure that they have the necessary certifications, qualifications, and quality control processes in place to meet the exacting standards.

II Literature Review

2. Sustainability - MSMEs

2.1 Sustainability in the basic sense conflates the shebang of socio, economic and environmental entities. MSMEs must raise awareness about sustainability among their employees, customers, and suppliers. This can include providing sustainability training, promoting eco-friendly behaviours, and encouraging sustainable practices among their stakeholders. MSMEs should adopt sustainable environmentally friendly practices like using eco-friendly materials, reducing waste, conserving energy, and promoting recycling. This not only helps the

environment but also reduces costs and enhances competitiveness. MSMEs should develop sustainable products or services meeting consumer needs, with minimal impact on environmental. This can include products made from renewable resources, energy-efficient appliances, and eco-tourism services.

2.2 MSMEs can collaborate with business houses for promoting sustainability reducing carbon footprint, which can be done by resource sharing, partnering in initiatives and forming industry associations. MSMEs can invest in sustainable technologies in terms of energy saving measures by using natural sources with solar panels, wind turbines. This not only reduces their environmental impact but also improves efficiency and reduces costs. Sustainability has to take a balanced and perspicacious view of economic, environmental, and social aspects for creating an equitable vibrant society not only for present but also for future generations as well. It is a balanced mix of these factors which make sound sustainability of any business.

2.3 Singh et al.(2016) reported that "organizational sustainability emerged as a driving source of motivation to improve the business performance among manufacturing MSMEs in India. In addition, there is significant mediation effect of organizational sustainability on entrepreneurial commitment and business performance. It has also proven the vitality of organizational sustainability as a strategic action towards green and clean environment"(p.4615).

2.4 A Business sustainable Model for Indonesia was developed by enunciating the inhibitors which are to be controlled and enablers as supportive factor:-

"Inhibitor - Customer: Customer Value proposition, Demand
Government: Policy for competition, financial support and price control
Sustainable power- Opportunity: - Low risk and low cost production Different track with superior enterprise
Automated Process And Mapping & Control Market
Skill Human Resources with transfer knowledge
Enabler - Environment Behavior
IT support Business Capability
Human Resource" (Yeffrey et.al, 2016).

This model is generic in nature enumerating the various facets involved in sustainability of MSMEs; hence the model is equally valid in the Indian context also.

2.5 Khurana(2018) has emphasised "the need and benefit of integrating sustainability with innovation , with a study of literature on sustainability, sustainable development, sustainable manufacturing and innovation. Also, literature is obtained indicating how integrating sustainability with innovation acts as an enabler for MSME's to enhance their opportunities and to increase their development potential".

2.6 Human Resource Management in an organisation plays a positive and pivotal role in promoting sustainability of the business enterprise. The leadership role assumes importance at all levels to permeate and percolate sustainability awareness programs so as to keep abreast of advancements in the multi-faceted disciplines. According to the findings in a study,

> MSME entrepreneurs perform the boundary spanning role and serve as the key linkage between external and internal environments in which the business operates. Awareness is the first level toward a commitment to sustainability. The study proposes an emerging conceptual framework presenting four dimensions that discusses the role of employee relations and HRM practices in strengthening MSME commitment to sustainability. These four dimensions are Awareness, Action, Comprehensiveness and Excellence. (Mridul Maheshwari et al. , 2020, p.1743)

2.7 Jamwal et al.(2021) in a study on the sustainability reported that "Supply chain, Environmental, Information and Technology are the main cause enablers whereas organizational & social and Economic are the effect enablers. The supply chain practices support the development of other enablers like Environmental enablers and Information & technology enablers. Also, the organizational & social enablers and economic enablers depend on the cause of enablers. The supply chain and Environmental enablers have a strong influence on the adoption of sustainability practices in Industry 4.0"(p.340).

2.8 Environment, economic and social issues form the three vital pillars of the sustainability. According to a study undertaken on "Ranking of indicators of sustainable manufacturing in Indian MSMEs

> Indian MSMEs are under intense pressure to integrate sustainability in manufacturing to products and operations more sustainable. Adopting Strategies and techniques of sustainable manufacturing results in improved environmental performance, but this improvement should be balanced with economic and social aspects of sustainability. In this context indicators of sustainability furnish valuable information regarding the state of sustainability. Design for Green Environment is the most important indicator of sustainability of a manufacturing organization in MSME sector followed by quality and Productivity" (Abdul Gani et al. , 2021).

2.9 Hudnurkar et al. (2022) conducted a study on the "significance of Total Quality Management (TQM) and Innovation capability (IC) in the context of manufacturing industries in the Indian Micro Small and Medium Enterprises (MSME) sector. The authors measured TQM through product control management, process control, vendor quality management and customer relationship improvement and found a direct relationship between TQM and Corporate sustainability (CS), along with its three dimensions: environmental sustainability, economic sustainability, and social sustainability. TQM was found to be antecedent to IC. IC, measured through product innovation, process innovation and managerial innovation, did not mediate the relation between TQM and CS. However, the link between TQM and social and environmental sustainability partially mediates through IC at the dimension level."

III Research Methodology

3.1 Purpose of the study is to confirm the relationship between Business with Shipyards and Sustainability.

3.2 Variables and Measurement

Business with shipyards is an unobserved latent variable also called construct. Since it is multi-dimensional in nature, seven measured indicators have been used to measure business with shipyards in Warship building. List of these indicators are as follows :-

1. Our Company is dependent on foreign suppliers.
2. What is the level of satisfaction in your turn over on orders from shipyards?
3. Our company get any preference in the tendering process over large business houses?
4. We supply the item to shipbuilders at the contractual cost.
5. We supply to the shipbuilders without any time over run.
6. How do you rate "Ease of doing Business" with the shipyards?
7. How do you rate "Ease of Access to Finance" from Financial institutions?

Independent variable - Business with shipyards

Dependent variable - Sustainability

Sustainability is an outcome variable and multi- dimensional in nature. The measured indicators of sustainability are as follow :-

1. Our company utilise the Credit Linked Capital Subsidy Scheme (CLCSS) instituted by the Government of India providing upfront capital subsidy for Technology upgradation.
2. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Entrepreneurial and Managerial development.
3. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Intellectual Property Rights (IPR).
4. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Design Expertise in manufacturing sector.
5. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on providing marketing assistance.
6. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Technology upgradation and Quality upgradation support.
7. Our company utilise the ISO 9000/ ISO 14001 certification reimbursement scheme provided by the Government of India under the National Competitiveness Manufacturing Programme (NMCP).

3.3 Hypothesis

H_0: There is no correlation between Business with shipyards in warship building and sustainability (R=0)

H_1: There is a significant relationship between Business with shipyards in warship building and sustainability ($R \neq 0$)

Level of significance for testing hypothesis $\alpha = .05$

3.4 Data analysis

3.4.1 Having identified the measurement indicators and scales, a pilot study was undertaken. Data collection was done by farming out the questionnaires containing the ten indicators for response on 5 point Likert scale, to 50 MSMEs involved in the warship building programme. In order to obtain representative samples, the questionnaires were farmed out to all the Government owned ship yards, PAN India; which includes Mazagaon

Ship builders, Mumbai, Garden Reach Shipbuilders, Kolkata, Cochin Ship yard Ltd, Goa ship yard Ltd, Hindustan Shipyard Ltd, Visakhapatnam and as well to a private shipyard owned by L& T.

3.4.2 To ensure that the instrument is usable and effective, the data collected from 50 MSMEs was tested for Reliability and Validity. Since every item is measured using 5 point interval scale, Cronbach Alpha was used to confirm Reliability and construct validity used to examine the accuracy of the instrument. Construct validity includes Factor Loading and average variance extracted. The responses were tested for Reliability and Validity. Cronbach Alpha of .786 for Business with shipyards (BWS) and 0.898 for sustainability (SBL) achieved and all measurements are positively contributing; alpha value ranges between 0 and 1; the threshold being 0.7 and above. Confirmatory Factor Analysis indicated factor loading of above 0.5 and the Average Variance Extracted to be above 0.5 , proving the validity of the measurements. Having found that the measurement indicators evolved are reliable and valid, the questionnaire on the Technology and Research & Development was farmed out to 100 more MSMEs. Responses were collated and statistically analysed by canonical correlations.

3.4.3 "Canonical Correlation Analysis is a multivariate statistical technique used to identify and measure the relationship between two sets of variables by finding linear combinations of variables from each set that are correlated with each other maximally. By Canonical Correlation Analysis, the canonical correlation coefficients are found out. The correlation coefficients reflect the strength of the association between the linear combinations of variables in the two datasets. The value of canonical correlation coefficients ranges from 0 (indicating no correlation) to 1 (indicating perfect correlation)" CCA is used to answer questions such as: How are two sets of variables related to each other? What variables are most important in predicting outcomes in one dataset based on variables in the other dataset?

3.4.4 Canonical Correlations Test Results

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	.581	.510	.419	2.361	49.000	618.719	.000
2	.430	.227	.632	1.646	36.000	538.500	.012
3	.339	.129	.776	1.299	25.000	458.427	.154
4	.281	.086	.876	1.051	16.000	379.464	.402
5	.157	.025	.951	.705	9.000	304.368	.705
6	.154	.024	.975	.798	4.000	252.000	.527
7	.032	.001	.999	.130	1.000	127.000	.719

"H0 for Wilks test is that the correlations in the current and following rows are zero".

Set 1 Standardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7
BWS1	-.016	-.355	-.132	-.798	.423	.250	.357

BWS2	-.461	-.471	.489	-.213	.801	-.699	-.457
BWS3	-.124	1.046	-.309	-.181	.060	-.308	.391
BWS4	-.167	.669	1.015	-.283	-.868	-.173	.105
BWS5	-.282	-.181	-.135	.448	.619	1.046	-.233
BWS6	.094	-.519	-.329	.740	-.390	.268	.967
BWS7	-.424	-.268	-.842	-.327	-.348	-.184	-.481

Set 2 Standardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7
SBL1	.512	.151	.932	-.463	-.392	-.380	-.082
SBL2	-.561	-.503	.491	-.571	1.109	.345	-.214
SBL3	.277	.908	-.146	.662	-.594	1.323	.090
SBL4	-.096	-1.013	-1.152	-1.156	-1.012	.221	.217
SBL5	-.391	.491	.232	.308	.548	-.483	1.239
SBL6	-.544	.121	.754	1.038	-.202	-.923	-.866
SBL7	.030	.523	-.804	-.471	.304	-.208	-.547

Set 1 Unstandardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7
BWS1	-.014	-.315	-.117	-.709	.376	.222	.317
BWS2	-.445	-.455	.472	-.205	.773	-.675	-.441
BWS3	-.108	.913	-.270	-.158	.053	-.269	.341
BWS4	-.115	.464	.703	-.196	-.601	-.120	.073
BWS5	-.202	-.130	-.097	.321	.444	.751	-.167
BWS6	.090	-.497	-.315	.708	-.373	.257	.926
BWS7	-.563	-.355	-1.117	-.433	-.462	-.244	-.638

Set 2 Unstandardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7
SBL1	.427	.126	.777	-.386	-.327	-.317	-.068
SBL2	-.577	-.517	.505	-.587	1.140	.355	-.220

SBL3	.271	.892	-.144	.650	-.583	1.299	.088
SBL4	-.086	-.911	-1.035	-1.039	-.910	.199	.195
SBL5	-.405	.508	.241	.319	.568	-.501	1.283
SBL6	-.501	.112	.695	.956	-.186	-.850	-.797
SBL7	.021	.377	-.579	-.339	.219	-.150	-.394

Set 1 Canonical Loadings

Variable	1	2	3	4	5	6	7
BWS1	-.078	-.226	.031	-.785	.128	.307	.463
BWS2	-.747	-.196	.239	.172	.322	-.431	.166
BWS3	-.515	.602	-.274	.070	.306	-.191	.403
BWS4	-.719	.054	.450	-.169	-.419	.227	.148
BWS5	-.733	.158	.079	.184	.168	.606	-.058
BWS6	-.589	-.292	-.024	.324	-.143	-.121	.654
BWS7	-.752	-.146	-.415	-.162	-.422	-.005	-.191

Set 2 Canonical Loadings

Variable	1	2	3	4	5	6	7
SBL1	-.050	.438	.537	-.618	-.359	-.082	-.009
SBL2	-.730	.131	.339	-.424	.085	.359	-.138
SBL3	-.569	.514	.175	-.171	-.370	.462	-.030
SBL4	-.739	.093	-.003	-.393	-.531	.044	.080
SBL5	-.672	.467	.086	-.245	-.156	-.150	.465
SBL6	-.825	.225	.169	-.011	-.406	-.123	-.247
SBL7	-.309	.707	-.258	-.462	.038	-.180	-.302

“Set 1 Cross Loadings”

Variable	1	2	3	4	5	6	7
BWS1	-.045	-.097	.011	-.221	.020	.048	.015
BWS2	-.434	-.084	.081	.048	.051	-.067	.005
BWS3	-.299	.259	-.093	.020	.048	-.030	.013
BWS4	-.418	.023	.152	-.047	-.066	.035	.005

BWS5	-.426	.068	.027	.052	.026	.094	-.002
BWS6	-.342	-.126	-.008	.091	-.022	-.019	.021
BWS7	-.437	-.063	-.140	-.046	-.066	-.001	-.006

Set 2 Cross Loadings

Variable	1	2	3	4	5	6	7
SBL1	-.029	.188	.182	-.174	-.056	-.013	.000
SBL2	-.424	.056	.115	-.119	.013	.056	-.004
SBL3	-.331	.221	.059	-.048	-.058	.071	-.001
SBL4	-.429	.040	-.001	-.111	-.083	.007	.003
SBL5	-.390	.201	.029	-.069	-.024	-.023	.015
SBL6	-.479	.097	.057	-.003	-.064	-.019	-.008
SBL7	-.180	.304	-.087	-.130	.006	-.028	-.010

Proportion of Variance Explained

Canonical Variable	Set 1 by Self	Set 1 by Set 2	Set 2 by Self	Set 2 by Set 1
1	.399	.135	.376	.127
2	.084	.015	.179	.033
3	.073	.008	.077	.009
4	.121	.010	.145	.011
5	.088	.002	.106	.003
6	.107	.003	.060	.001
7	.128	.000	.056	.000

IV. Inference

4. The following inferences are drawn, meeting the Research objectives:-

(a) The measurement instrument formulated for the Business with Shipyards and Sustainability Technology and R&D policies towards involvement of MSMEs in warship building is reliable and valid.

(b) Wilks statistics shows 0.419. Hence, the unexplained variation is around 42 %, which indicates that there is more explained variance compared to unexplained variance.

(c) In F test value of F(49,618) being 2.361 and p value is less than 0.05, it is concluded that there is a significant relationship between “Business with shipyards” and sustainability.

(d) Value of R being 0.581, positive value of R indicates a direct relationship between variables "Business with shipyards" and "Sustainability". In other words, if Business with shipyards is increased sustainability of MSMEs will also move upwards. Since the value is close 0.6, it indicates almost strong relationship between the two variables – Business with Shipyards and Sustainability.

V. Conclusion

5..Evolving reliable and valid measurement indicators for the Business with shipyards by the MSMEs and their sustainability in turn is a unique study by itself.. The measurements reveal that the Government policies amply supports the MSMEs in warship building ensuring their sustainability. Though there are huge number of MSMEs in the country, its participation in the warship building programme is highly limited, particularly in the area of Fight capability of warships. MSMEs need to conjoin and make collaborative efforts to partake in larger measure in the warship building programme to achieve self-sufficiency. Concerted efforts to streamline and seamlessly integrate the MSMEs with their core strengths to catapult in the warship building programme, with the ultimate objective towards Atma Nirbhar Bharat. The indicators provide a good tool for integrating the MSMEs in warship building programmes. MSMEs can quickly step into Warship building arena by following the indicators evolved as it serves as a good bench mark.

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